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# The genus *Trynocoris* Herring, 1976 (Heteroptera: Miridae: Cylapinae) is no longer monotypic: *T. costaricaensis* sp. nov. from Guanacaste, north-western Costa Rica

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**Abstract.** A revised diagnosis of the genus *Trynocoris* Herring, 1976 is presented and a new species, *Trynocoris costaricaensis* sp. nov., is described based on specimens collected in Costa Rica. Colour photographs of the adult and illustrations of the male genitalia are provided for the new species. Scanning electron micrographs of selected structures of the new species are also given.

**Key words.** Biodiversity, Fulviini, new species, Neotropics, plant bugs, taxonomy, true bugs.

## INTRODUCTION

The genus *Trynocoris* Herring, 1976 was described as monotypic for *T. lawrencei* Herring, 1976 based on specimens collected in Panama (Herring 1976). The genus was placed in the tribe Fulviini within Cylapinae (Herring 1976). In addition to Fulviini, the subfamily Cylapinae also includes representatives of the tribes Cylapini and Vanniini in the Neotropical Region. Distribution and biology of the New World Cylapinae still remain poorly known, although several genera have been revised and new taxa have been described recently (e.g., Chérot & Carpintero 2016; Wolski 2017; Wolski et al. 2020). Some representatives of Cylapinae (particularly in the tribe Cylapini) are mycetophagous (Wheeler 2001), but *Trynocoris lawrencei* probably feeds on larvae of beetles that live in fungi (Herring 1976). Gorczyca et al. (2019) redescribed *Trynocoris* and *T. lawrencei*, and cited new sampling localities in Panama, Mexico, Ecuador and Nicaragua.

While studying the material collected in Costa Rica in the collection of the Division of Entomology, University of Kansas Natural History Museum (Lawrence, Kansas, USA; KUNHM), the authors found two specimens of a new species of the genus *Trynocoris*. In the present paper we provide a revised diagnosis of the genus and describe the new species. Furthermore, we compare the morphology, including genitalia, of both species of *Trynocoris*.

## MATERIAL AND METHODS

The specimens were imaged using the following equipment: Leica M205C stereo microscope with high diffuse dome illumination Leica LED5000 HDI, Leica DFC495 digital camera and Leica application suite 4.12.0 software; Leica DM 3000 upright light microscope with Leica MC 190 HD digital camera and Leica Application Suite ver. 4.13.0 software. SEM photographs were obtained using Phenom XL field emission scanning electron microscope at 10 and 15 kV accelerating voltage with a BackScatter Detector (BSD). Graphic editor Adobe ®Photoshop ver. CS6 was used to edit the figures. Measurements were made with Leica application suite ver. 4.12.0 software and are presented in millimeters (mm). The measured body parts were defined in Wolski (2014). Dissections of male genitalia were done according to Kerzhner and Konstantinov (1999). The original description was used to identify the genus (Herring 1976). Adult terminology used in the text follows Schuh & Weirauch (2020).

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The terminology of the male genital structures follows Kerzhner & Konstantinov (1999), Konstantinov (2003), Cassis (2008) and Schuh & Weirauch (2020).

## RESULTS

### Taxonomy

***Trynocoris*** Herring, 1976

*Trynocoris* Herring 1976: 91 (as new genus) [type species: *Trynocoris lawrencei* – original designation].

*Trynocoris*: Schuh, 1995: 38 (catalog), Schuh, R. T. (2002–2013 On-line Systematic Catalog), Gorczyca 2000: 49 (list of the genera of the tribe Fulviini), Gorczyca 2006: 69 (catalog), Gorczyca et al. 2019: 52 (redescription).

### Diagnosis

Distinguished from the other genera of Cylapinae by the following set of characters: body small (< 3.1 mm), oval to elongate oval, dorsum densely and deeply punctured (Figs 1A, 3A), covered with dense, scale-like setae, varying from linear to incrassate; second antennal segment thickened, sometimes flattened laterally; the fourth antennal segment subdivided (Fig. 1A–B; Gorczyca et al. 2019: fig. 1); cuneus short, apex of hemelytra at the level of cuneal fracture bent downward; tarsi two-segmented (Gorczyca et al. 2019: figs 10–12); male genitalia: pygophore trapezoidal, its dorsal wall long, almost as long as ventral wall, aperture of pygophore directed posteriorly; aedeagus thin; ductus seminis long and thin; endosoma membranous; left paramere with apical process broad in dorsal view and with relatively long, thin process on extreme apex; right paramere C-shaped its apical process broad when viewed dorsally with more or less developed process in the middle of right lateral margin (Fig. 2; Gorczyca et al. 2019: figs 17–20).

### Remarks

This genus belongs to the tribe Fulviini and the morphological characters that warrant this placement as well as the features indicating close similarity to some fulviines were discussed by Gorczyca et al. (2019).

Herein we confirm the two-segmented tarsi with tarsomere II undivided as one of the diagnostic features of *Trynocoris*. In Cylapinae, the number of the tarsal segments is variable depending on the tribe. The representatives of Bothriomirini, Cylapini, and Rhinomirini possess three-segmented tarsi (Wolski 2017; Namyatova et al. 2019; Namyatova & Cassis 2016, 2019, 2021). In contrast, in the tribe Fulviini, as circumscribed by Gorczyca (2000), the number of tarsal segments is variable depending on the genus. Genera *Carvalhofulvius* Stonedahl & Kovac, 1995 (Stonedahl & Kovac 1995: fig. 8), *Cylapocoris* Carvalho, 1954 (Wolski 2013), *Howefulvius* Schmitz & Štys, 1973 (Schmitz & Štys 1973: fig. 7), *Peritropisca* Carvalho & Lorenzato, 1978 (Wolski & Gorczyca 2014; Namyatova & Cassis 2019), *Sulawesifulvius* Gorczyca, Chérot & Štys, 2004 (Gorczyca et al. 2004: fig. 4; Wolski et al. 2017: fig. 10) and others have two-segmented tarsi, as well as many species of the genera *Fulvius* Stål, 1862 (Gorczyca 2000: figs 23E, 27D; Yasunaga 2000: figs 10–11; Wolski et al. 2018: fig. 45) and *Peritropis* Uhler, 1891 (Wolski & Henry 2012: fig. 81). Three-segmented tarsi are found in *Bironiella* Poppius, 1909 (Namyatova et al. 2016: fig. 19j), *Punctifulvius* Schmitz, 1978 (Yasunaga 2000: fig. 13; Namyatova & Cassis 2019: fig. 10n), *Yamatofulvius* Yasunaga, 2000 (Yasunaga 2000: figs 14–16) and in some species of *Peritropis* (Namyatova et al. 2016: 19I). Recently, Namyatova & Cassis (2019) pointed out that most fulviines, which they included in their phylogenetic analysis, have three-segmented tarsi and suggested that the two-segmented tarsi with the second tarsomere divided observed by many previous authors are in fact three-segmented tarsi. The question whether the tarsi observed among others by Gorczyca & Eyles (1997: fig. 5), Yasunaga (2000: fig. 12), Gorczyca (2002: 12) or Wolski et al. (2018: fig. 53) have two or three segments remains open. However, given the fact that many fulviines possess two-segmented tarsi, with no subdivision of the second segment, unlikely that all these observations are incorrect. Taking into account the existing differences in number of the tarsal segments among the fulviine genera, we believe that the two-segmented tarsi are a helpful character in defining the genus *Trynocoris* in combination with other diagnostic features of this genus herein presented.

### Key to the species of the genus *Trynocoris* Herring, 1976

1. Body covered with broadened, scale-like setae (Fig. 3A–B); second antennal segment weakly flattened laterally, covered with thick, scale-like setae ..... ***T. lawrencei*** Herring, 1976
– Body covered with linear setae (Fig. 1); second antennal segment not flattened, somewhat thickened toward the apex, covered with simple setae (Figs 1A, C; 3C) ..... ***T. costaricaensis*** sp. nov.

***Trynocoris costaricaensis*** sp. nov.

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Figs 1–2, 3C, 4C–D

### Diagnosis

The new species is similar to *T. lawrencei* (Figs 3A–B, 4A–B) but can be easily separated by the following character states: (1) Second antennal segment (Fig. 1) of female not foliaceous and laterally flattened, but basally and medially cylindrical, apically slightly club-like, its




**Fig. 1.** *Trynocoris costaricaensis* sp. nov., ♀, holotype (SM0210321 KUNHM-ENT). **A**. Dorsal view. **B**. Ventral view. **C**. Lateral view.

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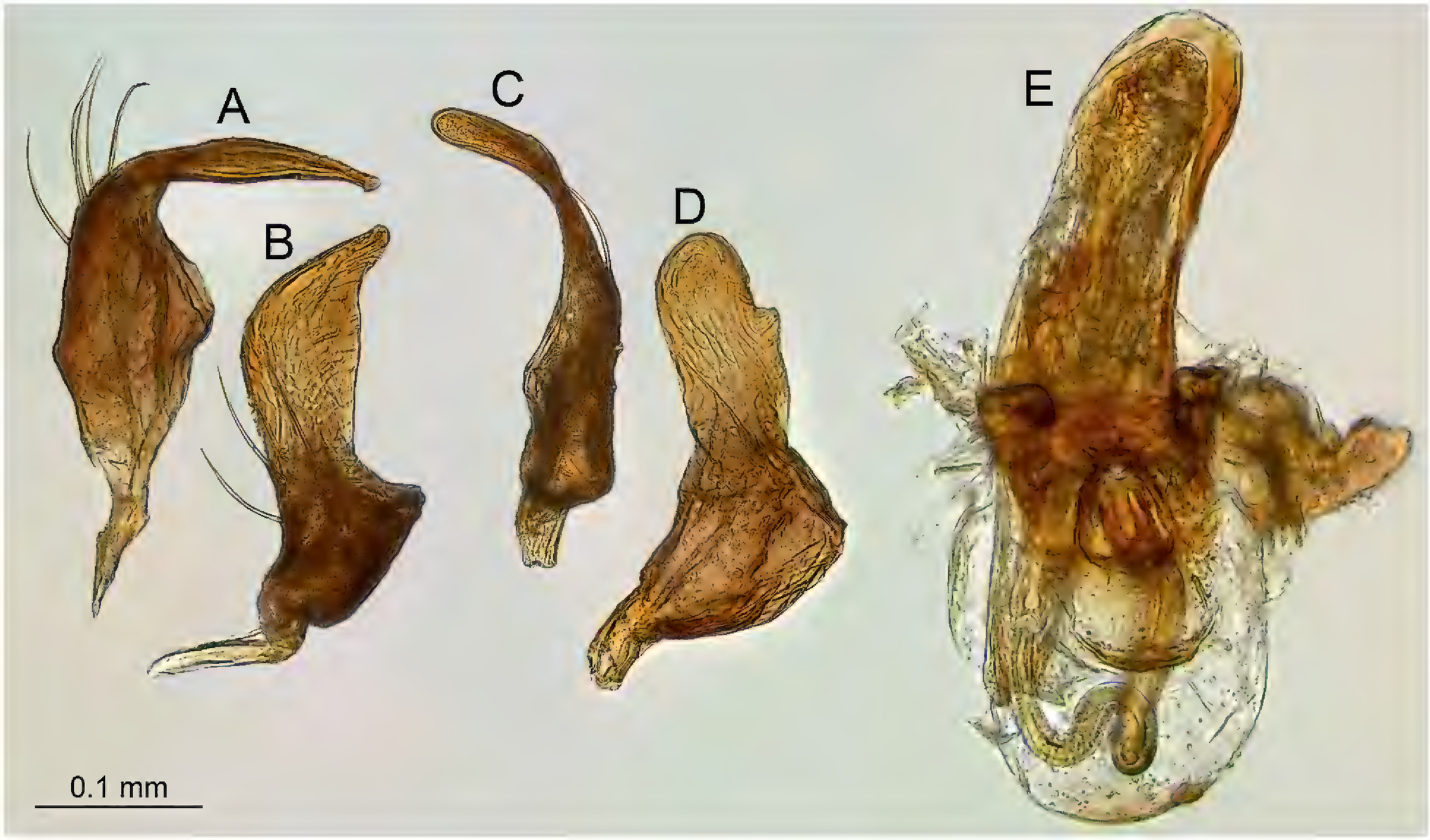



**Fig. 2.** *Trynocoris costaricaensis* sp. nov., ♂, paratype (SM0210194 KUNHM-ENT), genitalia. **A–B**. Left paramere. **C–D**. Right paramere. **E**. Dorsal view of endosoma.

colour pattern more complex (basally brown, medially orange-brown to orange, apically yellow *versus* evenly red-brown except its dorsal and ventral black margins in *T. lawrencei*). (2) Pilosity of second antennal segment (Fig. 1) limited to long, suberect to erect setae, similar to setae of third and fourth antennal segments (*versus* pilosity of second antennal segment including scale-like setae and thick, simple setae in *T. lawrencei*). (3) Absence of orange-red 'ventral neck or ring' easily visible under the eyes in *T. lawrencei*. (4) Labium reaching ovipositor (Fig. 1B–C) (*versus* in *T. lawrencei* reaching base of the abdomen in the female, but the pygophore in the male). (5) Body covered with setae curved, recumbent, barely widened apically, silvery bright under incident light (Figs 1A, 3C) (*versus* scale-like, whitish, dull, obviously widened apically in *T. lawrencei* (Fig. 3A–B)). (6) In males, the left paramere apical process in dorsal view with apex curved toward the right side; right paramere apical process in dorsal view with a moderately developed medial spine on right lateral margin (Fig. 2B, D).

**Etymology**

The specific epithet refers to the country where the type locality is found, Costa Rica.

**Type material**

Deposited at the University of Kansas Natural History Museum (KUNHM) (Lawrence, Kansas, USA).

**Holotype**

COSTA RICA • ♀; 'COSTA RICA Guanacaste / Cacao Biological Station, 1050 m / 10°55′38″ N, 85°27′7″ W / 11 JUL 2000, leg. J.Ashe, R. Brooks, / Z.Falin CR1ABF00 100 / ex. fogging fungus covering log // SM0210321 / KUNHM-ENT'.

**Paratype**

COSTA RICA • ♂, damaged and incomplete; 'COSTA RICA: Guanacaste / Cacao Biological Station, 1050 m / 10°55′38″ N, 85°27′7″ W / 11 JUL 2000, leg. J.Ashe, R.Brooks, / Z.Falin CR1ABF00 100 / ex. fogging fungus covering log // SM0210194 / KUNHM-ENT'.

**Description**

**Female**

**Measurements** (in mm). Body (in dorsal view): Length: 3.1, width 1.58. Head: Interocular distance (vertex width): 0.43, width of eye: 0.2, length of antennal segment I: 0.28, II: 0.63, III: 0.28, IV: 0.25. Pronotum: Medial length: 0.6, posterior width of disk: 1.33, length of lateral margin (between anterior and humeral angle): 0.6. Scutellum: Length (mesoscutum excluded): 0.53, length (mesoscutum included): 0.68, width: 0.73. Cuneus: Length: 0.3, width at base: 0.2.

***Colouration*** (Fig. 1A–C). Body black. ***Head***. Vertex (including narrow carina), frons and mandibular plates black. Clypeus and maxillary plates reddish brown. Eyes



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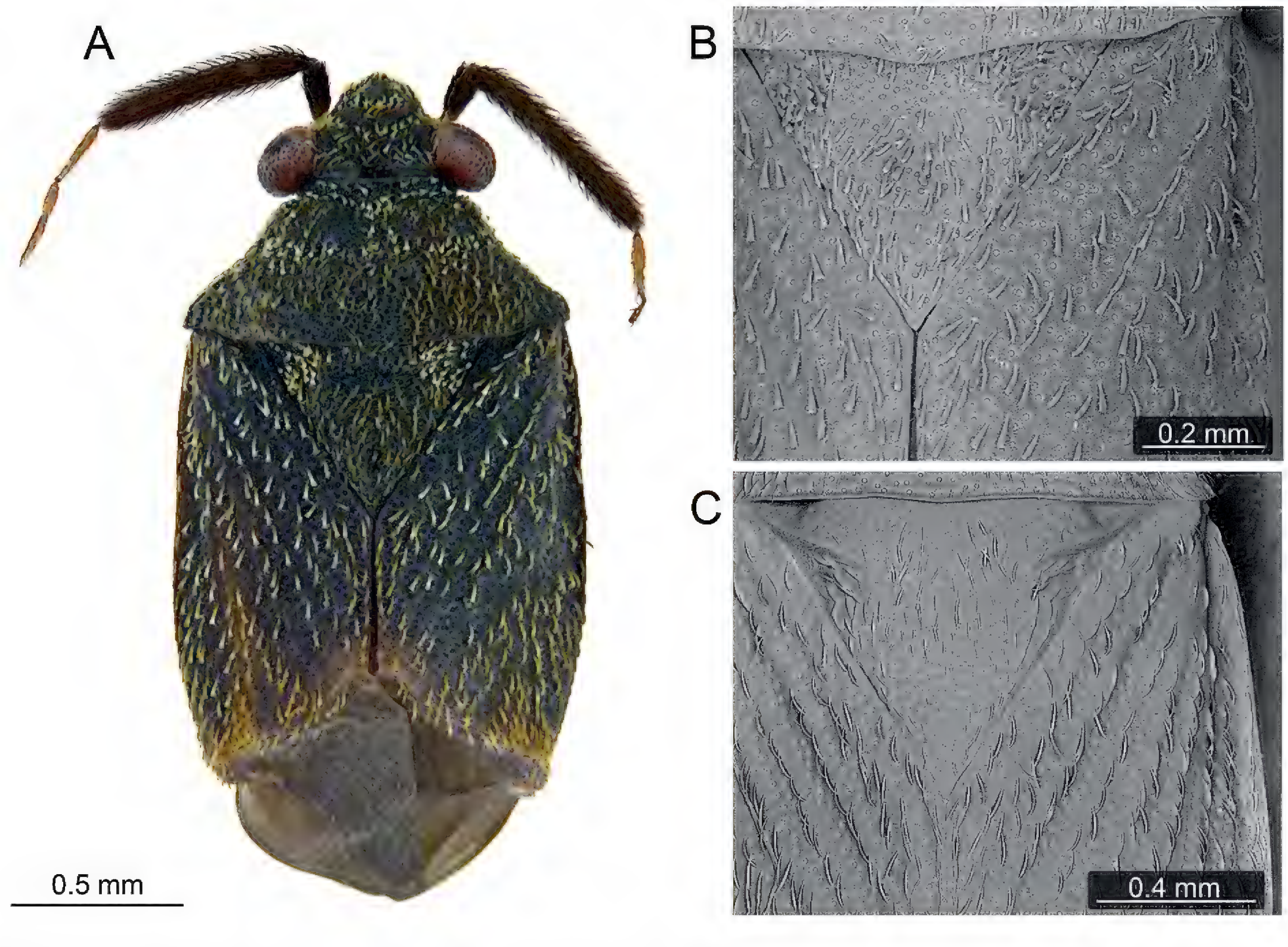



**Fig. 3. A**. *Trynocoris lawrencei* Herring, 1976, dorsal view. **B**. *T. lawrencei* Herring, 1976, dorsal surface of the body (according Gorczyca et al. 2019). **C**. *T. costaricaensis* sp. nov., ♂, paratype (SM0210194 KUNHM-ENT), dorsal surface of the body.

grey. First antennal segment reddish with a yellowish ring at basal third. Second antennal segment basally brown, medially orange-brown to orange, apically yellow. Third and base of fourth antennal segment brown, the apex of fourth antennal segment black. Labium brown, the first segment apically yellow. ***Thorax***. Pronotum and scutellum evenly black, pronotal collar reddish-brown. Metafemur wide, reddish-brown with dark reddish spots. Metatibia black with yellowish rings. Mesoscutum black, the lateral part brown. Clavus black, the apex yellow to orange. Endocorium black, its apex with a brownish median area and one yellowish spot at the inner corner. Exocorium brown with an elongate submedian longitudinal black stripe and an apical yellow spot. Embolium brown. Membrane grey. Cuneus orange-brown. Pro-, meso- and metapleuron black to reddish black, shining. ***Abdomen.*** Black.

***Structure, texture and vestiture*** (Fig. 1A–C). Body oval to elongate-oval. ***Head***. Declivous. Frons and vertex narrowly and shallowly punctate. Vertex posterior area slightly raised, narrowly carinate. Eyes relatively small, contiguous to the pronotal collar (partially hidden by the eyes laterally). The first antennal segment with relatively short, suberect setae, particularly apically. Second antennal segment bearing long, suberect to erect setae, longer apically, similar to setae of third and fourth antennal segments. The fourth antennal segment subdivided. ***Thorax***. Pronotal collar very short. Pronotal lateral and posterior margins carinate. Pronotal disk punctate, the punctation wider and deeper than dorsal punctation of the head. Pronotal callosities barely visible. Mesoscutum wide, posteriorly convex and laterally marginate. Punctation of mesoscutum and scutellum similar to pronotal punctation (Fig. 3C). Claval vein raised. Clavus and corium with two different type of setae: one short, black, recumbent the other slightly longer and curved, recumbent, barely widened apically, silvery bright under incident light, in rows on the basal part of the corium. Cuneus elongate oval, oblique, with sparse, very short, stiff, black setae. ***Abdomen.*** Thickened, not reaching the apex of membrane. ***Female genitalia.*** (Fig. 4C–D). Bursa copulatrix (= vagina, = genital chamber) totally membranous, devoid of sclerite. Sclerotized rings not visible in available specimens. Posterior wall not easily recognizable.

**Male**

Similar to female but smaller in size. The only male specimen is seriously damaged, headless and without trochan-



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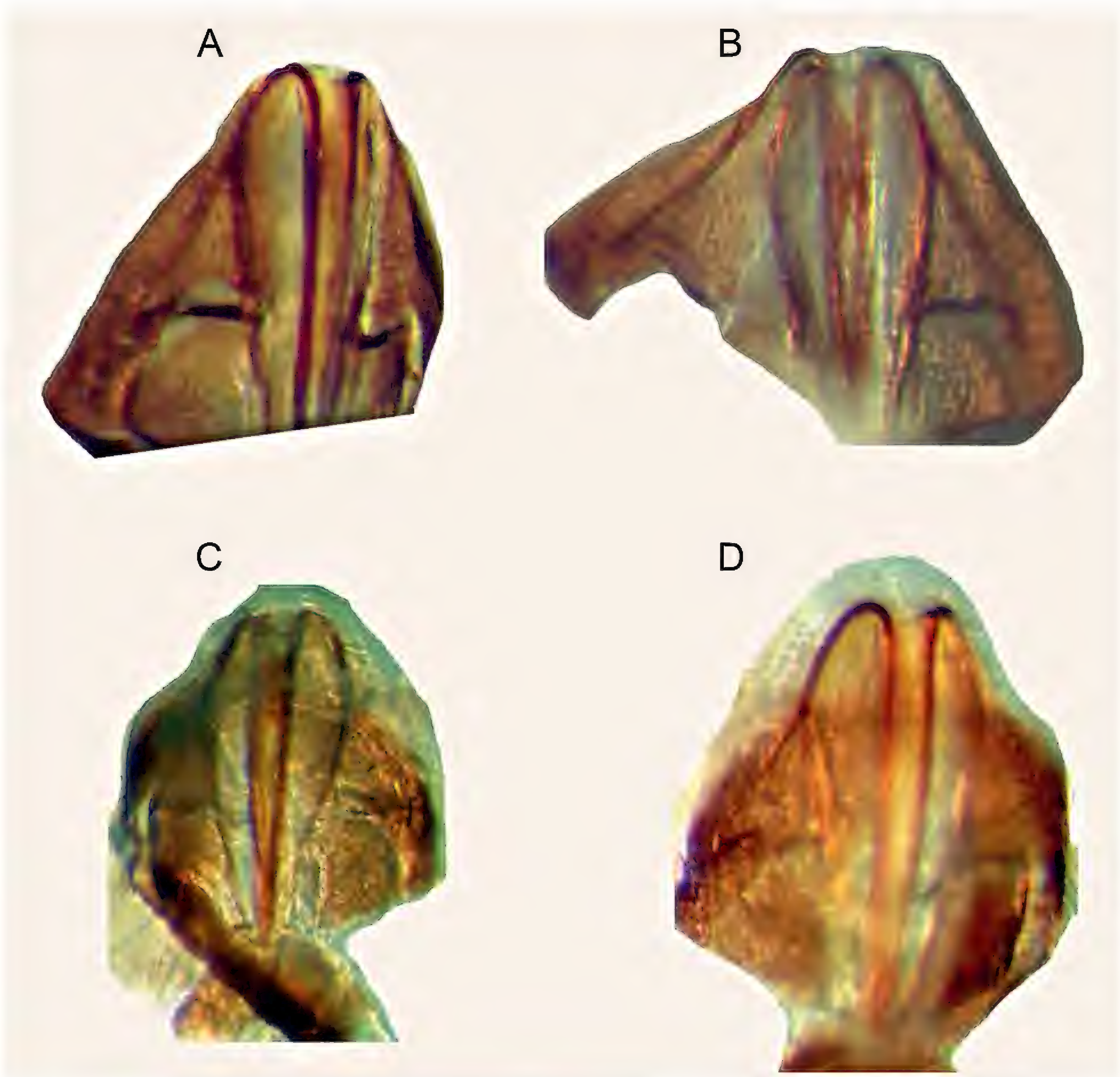



**Fig. 4.** *Trynocoris* spp., female genitalia in different views. **A–B**. *Trynocoris lawrencei* Herring, 1976. **C–D**. *T. costaricaensis* sp. nov.

ters and femora. ***Thorax***. Pronotum, mesoscutum and scutellum entirely black. Length of pronotum 0.50 mm, anterior margin 0.50 mm, lateral margins 0.65 mm, posterior margin 1.30 mm. Hemelytra black, covered with shining setae. Cuneus brown to dark brown tinged with orange at the base and along the external margin. Body ventrally chestnut to dark brown, coxae chestnut. ***Male genitalia*** (Fig. 2). Left paramere hook-shaped; apical process thin in lateral view, broadened basally, narrowed toward the apex, apical process broad in dorsal view, its apex curved toward the right side; paramere body with a bundle of long, thick setae dorsally, paramere body when viewed laterally with inner margin weakly convex basally and nearly straight and inner margin strongly convex medially. Right paramere C-shaped; apical process thin and curved in lateral view, in dorsal view apical process broad, nearly ellipsoid, with the moderately developed process in the medial part of the right lateral margin. Aedeagus narrow, ductus seminis thin and long, endosoma membranous.

**Distribution**

Costa Rica.

**Biology**

Unknown, but the specimens of this species were collected from a log covered with fungi. *T. lawrencei* was also collected in a similar habitat.



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